



2

**Span of Control and The Operational Commander:
Is It More Than Just a Number?**

**A Monograph
by
Major William G. Pierce
Corps of Engineers**

DTIC
SELECTE
S D
SEP 12 1991



**School of Advanced Military Studies
United States Army Command and General Staff College
Fort Leavenworth, Kansas**

Second Term 90-91

Approved for Public Release; Distribution is Unlimited

91-10369



068

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503.

1. AGENCY USE ONLY (Leave blank)		2. REPORT DATE 01/05/91		3. REPORT TYPE AND DATES COVERED MONOGRAPH	
4. TITLE AND SUBTITLE SPAN OF CONTROL AND THE OPERATIONAL COMMANDER: IS IT MORE THAN JUST A NUMBER?				5. FUNDING NUMBERS	
6. AUTHOR(S) MAJOR WILLIAM G. PIERCE, USA					
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) SCHOOL OF ADVANCED MILITARY STUDIES ATTN: ATZL-SWV FORT LEAVENWORTH, KANSAS 66027-6900 CDM (913) 684-3437 AUTOVON 552-3437				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSORING/MONITORING AGENCY REPORT NUMBER	
11. SUPPLEMENTARY NOTES					
12a. DISTRIBUTION/AVAILABILITY STATEMENT APPROVED FOR PUBLIC RELEASE; DISTRIBUTION UNLIMITED				12b. DISTRIBUTION CODE	
13. ABSTRACT (Maximum 200 words) This monograph addresses a fundamental problem in operational level command. The operational commander is required by Army and joint publications to organize his forces. In order to do this, the commander must understand the limits of his span of control when making his organizational decisions. The term span of control is neither defined nor explained in the army and joint publications. At the tactical level, the span of control is established in the applicable TO&Es. At the operational level, this is not the case. The variables that affect civilian span of control were examined in a military context. These factors are personality and organizational driven. The factors that have the greatest affect on span of control are similarity of function of subordinates, style of control the commander uses, the type of coordination required between subordinates, and the number of personal contacts the commander uses to control his forces. In addition, changes in structure, tasks and personnel will affect span of control over time.					
14. SUBJECT TERMS SPAN OF CONTROL, SPAN OF MANAGEMENT, COMMAND AND CONTROL, DECENTRALIZED COMMAND, MILITARY, OPERATIONAL COMMAND, OPERATIONAL ORGANIZATIONS				15. NUMBER OF PAGES 52	
				16. PRICE CODE	
17. SECURITY CLASSIFICATION OF REPORT UNCLASSIFIED	18. SECURITY CLASSIFICATION OF THIS PAGE UNCLASSIFIED	19. SECURITY CLASSIFICATION OF ABSTRACT UNCLASSIFIED	20. LIMITATION OF ABSTRACT UNLIMITED		

NSN 7540-01-280-5500

Standard Form 298 (Rev. 2-89)
Prescribed by ANSI Std. Z39-18
298-102

SCHOOL OF ADVANCED MILITARY STUDIES

MONOGRAPH APPROVAL

Name of Student: William G. Pierce, MAJ, Corps of Engineers

Title of Monograph: Span of Control and the Operational
Commander: Is It More Than Just A
Number?

Approved by:

Ernest R. Rogers Monograph Director
LTC Ernest R. Rogers, MBA

James R. McDonough Director, School of
COL James R. McDonough, MS Advanced Military
Studies

Philip J. Brookes Director, Graduate
Philip J. Brookes, Ph.D. Degree Program

Accepted this 8th day of May 1991

Accession For	
NTIS CRA&I	<input checked="checked" type="checkbox"/>
DTIC TAB	<input type="checkbox"/>
Unannounced	<input type="checkbox"/>
Justification	
By	
Distribution /	
Availability Codes	
Dist	Avail and/or Special
A-1	

ABSTRACT

SPAN OF CONTROL AND THE OPERATIONAL COMMANDER: IS IT MORE THAN JUST A NUMBER? by Major William G. Pierce, USA, 52 pages.

This study examines the issue of span of control for an operational commander. The operational commander is required by Joint and Army doctrine to organize his forces. In order to do so, he must understand the limits of his span of control when making organizational decisions.

Span of control is not defined in either Army or Joint publications, but the term is used in doctrinal manuals. At the tactical level, a span of control between two and five units is believed to be appropriate. However, the commander's span of control at tactical levels is much larger when CS, CSS and staff are considered. At the operational level, understanding what affects span of control is essential. For subunified commands, joint task force organizations, field armies or army groups, the operational commander must establish his own organization. Nowhere in doctrine is a methodology for doing this described.

Although the military does not define span of control, there is a wealth of information on it in management books. This treatment was examined in a military context. The factors that have the most influence on the commander's span of control are the similarity of function of the subordinates, the style of control of the commander, the type of coordination between the commander and his subordinates, and the number of personal contacts that the commander uses in his command style. Changes in the structure, tasks, and personnel will also affect the limits of span of control over time. Unfortunately, understanding the factors that influence span of control will not help a commander establish his initial span of control. They will only help him adjust his span of control given a number of subordinates and a situation. Thus, two to five subordinates appear to be a good starting place when the commander organizes his forces. Then, the commander must adjust his span of control based on the factors presented.

There are three major doctrinal implications in this study. The Army and Joint doctrine provides no information on how to organize forces - only that it must be done. This doctrinal void must be filled in future publications. The second is the criticality of reducing the amount of information the commander is presented during battle. The commander must establish a Commander's Critical Information Requirements (CCIR) and this list should be added to all campaign plans. This will ensure that all subordinate elements focus on what the commander needs to make his decisions. This will help the commander expand his span of control. Finally, the military education system must inculcate in all officers the philosophy and traits that foster decentralized control. This is the primary factor that will enable a commander to expand his span of control.

Table of Contents

I. Introduction	1
II. Span of Control Doctrine	4
III. Span of Control Theory - A Civilian Perspective. .	14
IV. Military Limits of Span of Control	20
V. Conclusion	38
Endnotes	41
Bibliography	48

INTRODUCTION

Command and control (C2) has been subjected to a considerable amount of scrutiny in the recent past. Lieutenant General Leonard P. Wishart, Combined Arms Center Commanding General, addressed C2 in an article in Military Review where he referred to Operation Just Cause.

A synchronized combat assault simultaneously placed joint forces at dozens of different locations, totally fixed the enemy and kept casualties and collateral damage to a minimum. Realistic training prepared the units involved, while superb leadership at all echelons, decentralized command and control and superior C2 systems allowed the swift and decisive execution of this highly successful contingency operation.¹

Operation Just Cause was a success, partly because of excellent C2. What exactly is command and control? Joint Publication 1-02 defines command and control as follows:

The exercise of authority and direction by a properly designated commander over assigned forces in the accomplishment of the mission. Command and control functions are performed through an arrangement of personnel, equipment, communications, facilities, and procedures which are employed by a commander in planning, directing, coordinating, and controlling forces and operations in the accomplishment of the mission.²

Field Manual 100-5, Operations, does not give a definition of command and control, but indicates its importance. The key to the section on C2 is, "Common to all operations -- close, deep and rear -- is the necessity for superior command and control."³ This quotation implies that effective C2 is crucial to winning on the AirLand battlefield. In establishing an effective C2 structure, the operational commander is faced with a problem. As the size of the unit increases, the structure of that unit becomes less defined. At the squad level, there is a well defined structure as outlined in the applicable Table of Organization and Equipment (TO&E). This holds

true up through the division level. However, at corps and higher (operational) level units, there is no set structure, and these units are constructed and organized with specific forces to accomplish their mission. It will be shown that it is the operational level commander's responsibility to build and organize his forces. In establishing these organizations, one of the factors that the operational commander must consider is the concept of span of control. It does no good to organize a force if there are too many subordinate headquarters to control effectively. At the same time, it is wasteful if the commander is idle or over-supervises his forces because he has too few forces to control. Unfortunately, doctrine does not provide the commander with any guidance on how to organize his forces.

To help the operational commander build his force, this monograph will answer the following question: What are the parameters that determine how many subordinates an operational commander can effectively control? The question cannot be answered unless there is a criteria to measure the evidence by. Since the concept of span of control is directly related to command and control, then the limits of span of control will be reached when the operational commander can no longer command his forces efficiently and continuously.

There is one limitation to this study. This monograph assumes a mid- to high intensity wartime environment. This does not appear to be unreasonable because in mid to high intensity combat, there is a potential for frequent changes in commanders and staffs due to casualties, and rotations.

There are two primary reasons why understanding the parameters surrounding span of control are critical to the success of the

operational commander. The first reason relates to the recent political decisions to reduce the size of the Army. As the Army gets smaller, in order to maintain the same fighting capability the size of the headquarters elements must also decline. It does no good to have an Army that has a disproportionate number of headquarters elements. Every soldier assigned to a headquarters takes the place of a potential fighter. While headquarters are essential in generating and directing combat power, and synchronizing efforts of the fighters, the fewer the headquarters the greater the number of actual fighters. Thus, commanders must understand the limits of span of control so they can reduce to the minimum possible the number of headquarters positions while providing continuous C2.

The second reason for understanding the limits of span of control was alluded to in the above paragraphs. At the tactical level there are well defined structures and the span of control of tactical leaders is fixed by the TO&E. At the operational level, there are no fixed organizations and the operational commander must organize his forces. In the process of doing this, the commander needs to understand what parameters affect his span of control.

This monograph is organized into five sections. After the Introduction, Section II will examine the military theory and doctrine on span of control. It will address both tactical and operational doctrine and describe the differences between span of control at different levels. Section III will describe the theory of span of control from the civilian perspective. This section will outline the factors that influence the limits of span of control in the civilian sector. Section IV will examine the factors that influence civilian

span of control in a military context and determine if these factors have any applicability in operational level organizations. Section V will conclude the study with a summary of the answer to the original research question and address the doctrinal implications of that answer.

SPAN OF CONTROL DOCTRINE

This section will provide the theoretical basis for understanding span of control. It will also look at the current tactical and operational doctrine on span of control.

While the expression "span of control" is used in military publications, it is neither defined nor explained. The two Army publications that provide definitions are Army Regulation 310-25, Dictionary of Military Terms, and FM 101-5-1, Operational Terms and Symbols. Neither of these publications contain any reference to span of control.⁴ The same problem exists in the Joint arena. JCS Publication 1-02, Department of Defense Dictionary of Military and Associated Terms, neither defines nor mentions span of control.⁵ While it is inconvenient to work with an expression that is not defined, span of control is used in the doctrinal literature and is generally understood to mean the number of subordinates reporting to one commander. Before proceeding to its contemporary use, it is useful to look at a theoretical basis for understanding span of control.

Theory

Carl von Clausewitz, the premier military theorist of the 19th century, did not mention span of control in his work On War. He did, however, discuss the concept and its importance. He said,

Order of battle means the distribution and composition of arms as individual parts of the whole. . . . There have even been times when the order of battle was considered the most important part of the action.⁶

In describing how the parts fit into the whole, Clausewitz specified the optimum number of parts or units in an army. His conclusion was that the optimum number is eight. These parts are a vanguard, three parts for the main body, two for reserve, and a left and right flank guard.⁷

Clausewitz also realized that the "total number of parts must not become so large that confusion will result." He went on to state that it would be difficult for one headquarters to manage eight subdivisions and that the limit was probably ten.⁸ With these statements, Clausewitz acknowledged that there is an upper limit to the span of control of an army commander.

Clausewitz also delineated the disadvantages of a small span of control. While he conceded that command of an army is easier if orders only need to be given to three or four other men, there are two major disadvantages with this type of organization. Orders lose "speed, vigor and precision" if they have to travel through many layers of command, and "a general's personal power and effectiveness diminishes in proportion to the increase in the sphere of action of his closest subordinates."⁹ He continues with this line of thought by describing how each link in the chain of command reduces the effect of an order. The two ways are simply by the process of being transferred (implying distortion of the message through several layers of command) and by the additional time needed to pass the order.¹⁰ Martin Van

Crevelld also confirms the notion that large spans of control result in speed of execution.¹¹

Clausewitz believed that the limits of span of control were dependent on the level of command. At the army level, eight was the optimum number. At the division level, because there are far fewer means for transmitting orders in action, then "five subunits must be considered the appropriate figure."¹² Even though the means for rapid dissemination of orders did not exist at the division level, Clausewitz made no allowance for the shorter distances between the units at the division level.

Clausewitz specified numbers for what he believed was the optimum span of control at army and division level, but did acknowledge that span of control is dependent upon the situation. One example of how the span of control is affected by the situation is when the parts of an army are separated by a major terrain feature such as a river.¹³

The above section provides a background to the concept of span of control. Clausewitz recognized its importance tried to establish an optimum span of control for his army. The next section will address the current tactical and leadership doctrine concerning span of control.

Tactical Doctrine

Since span of control is connected with leadership, it might be instructive to look at the Army's leadership manuals for guidance on this subject. FM 22-100, Military Leadership, is the Army's basic leadership manual. Nowhere in this manual is the concept of span of control mentioned or implied. This is not totally surprising because the span of control for tactical leaders is specified in the TO&E.

There are, however, situations where the tactical commander can make decisions that affect the span of control of his subordinates. A task force commander can change the task organization of his unit by rearranging the number of platoons under the control of each company commander. It is not inconceivable that a mechanized infantry company commander could control three mechanized platoons, a tank platoon, a scout platoon, an anti-tank platoon and a mortar platoon in a counterreconnaissance mission. However, the battalion commander receives no guidance from the leadership manual on the effect of span of control when task organizing.

Span of control is alluded to in the brigade, division and corps manuals. Field Manual 71-3, Armored and Mechanized Infantry Brigade, states, "As a rule, each brigade can control two to five battalions and supporting CS and CSS elements." It continues with a qualifier, ". . . as the battle increases in intensity, the brigade commander's span of control must be limited to a controllable number of battalions, generally not more than four."¹⁴ While these statements seem to place a limit on the brigade commander's span of control, the manual provides no information on what that "controllable number" is or how it is ascertained.

Field Manual 71-100, Division Operations, specifies the mission of the division headquarters. "The division headquarters provides command, control, and supervision of the tactical operations of the division and its organic, attached or supporting units." It continues with the span of control. "Normally, the division will command and control two to five ground maneuver brigades."¹⁵ While this limit appears to be five units, the actual span of control of a division

commander is much higher. In addition to the three ground maneuver brigades, there is an aviation brigade, a division artillery, a support command, a cavalry squadron, and a staff. This totals eight subordinates who answer to the division commander and does not include any of the four separate battalions in the division (ADA, engineer, MI, and signal) or any corps assets such as an attack helicopter regiment that may be OPCON to the division. While the commander has two assistant division commanders, the manual does not describe how they reduce the commander's span of control.

The Corps Operations manual is a little more enlightening on the problem of span of control. The manual states that "one of the missions of the corps commander is to task organize the corps for combat." The problem of span of control is at least recognized in the statement, "the deputy corps commander extends the corps commander's span of control in areas and functions designated by the commander and required by METT-T."¹⁶ The "normal" span of control of the corps is also provided. "The corps normally has two to five divisions of any type and combination."¹⁷

While this sounds reasonable, in practice a situation similar to that of the division exists to a much greater extent. Corps are tailored for the theater and mission for which they are deployed. For this reason, there is no standard organization for the corps. However, the manual does provide a diagram of what a "typical corps" looks like. This typical corps has three divisions, two separate brigades, an armored cavalry regiment, an aviation brigade, a corps artillery, a staff, and eleven separate CS and CFS brigades and battalions that answer directly to corps headquarters.¹⁸ It is not

stated in the manual how one commander (or the commander and his deputy commander) can control anywhere from nine to twenty subordinates.

The Army's position on the optimum tactical span of control appears to be between two and five subordinate units. This is confirmed by Major Andy Sandoz in a monograph that investigated tactical span of control and initiative. He concluded that most tactical units in the U. S. Army have three subordinate units. He believed that this is an ideal mix for leader initiative in mobile war. It provides leaders the flexibility and control to exploit initiative.¹⁹ While three appears to be the magic number, in actuality, these are only ground maneuver units with the implication that control of aviation, and all other types of units is not a consideration in determining the limits on the commander's span of control.

Although there are doctrinal voids in analyzing the span of control at the tactical level, TO&Es obviate most of the problems. As the unit gets larger, the span of control problems seem to increase without the corresponding increase in information on how to handle this situation. The next section of the monograph will address the operational doctrine on span of control.

Operational Doctrine

The Army's two leadership manuals describe the differences between the tactical and operational level of war. Field Manual 22-103, Leadership and Command at Senior Levels, states, "Unlike Junior leaders, senior leaders divide their attention between larger organizational concerns and the personal leadership of those who take

direct action in their behalf."²⁰ Senior level leaders "provide vision . . . build organizations and create conditions that enable Junior level leaders to accomplish tasks and missions."²¹ Both of the above statements imply that the senior level leader must understand how to organize forces. What kind of organizational skills are needed?

The senior leader at the "operational level of war must possess direct and indirect organizational skills."²² While six skills are listed, the one that is of immediate concern is the requirement to "properly resource organizations and understand the long-term implications of this."²³ Field Manual 22-103 also lists one component of the military organization as the structure, but no mention is made of span of control nor is there any advice throughout the manual on how to develop the structure.²⁴ In the discussion on the organization, the manual confuses the reader by claiming "most military organizations are depicted as block charts or wiring diagrams arranged according to rational logic."²⁵ The inconsistency between the requirement for the senior leader to organize his forces and the statement that most organizations are already established is never reconciled. In any event, the Army's leadership manuals provide little insight as to how a senior leader is supposed to organize his forces. While the leadership manuals provide no help for the operational commander in organizing his forces (and thus establishing his span of control), the Army doctrinal manual on Large Unit Operations does no better.

Field Manual 100-6, Large Unit Operations, establishes doctrine for the operation and functioning of organizations at echelons above

corps. The next operational level is the army group. This level headquarters may be required when "an operational headquarters between the theater of operations and the corps is needed." One of the conditions that influence the decision to establish an army group is when the "span of control of the theater of operations headquarters is becoming too large."²⁶ However, instead of helping the operational commander determine if his span of control is too large, the manual provides vague guidance such as "the theater commander must take special care to ensure that the organization of the theater is correct and command relationships are clear."²⁷ Again no details are provided on how to do this. The manual does state, in the same manner as the brigade, division and corps manuals, that the army group is organized to control from two to five corps but there is no background information on the factors that influenced this figure.²⁸ The problem of determining the limits of span of control is not unique to the Army. There is also a noticeable lack of information on how to determine the limits of a commander's span of control in Joint publications.

Joint Chiefs of Staff Publication (JCS Pub) 3.0, Doctrine for Unified and Joint Operations, states that one of the primary CINC responsibilities is to "organize the command."²⁹ However, for all the CINCs in the Unified and Specified commands, their command is already organized. The Armed Forces Staff College Publication (AFSC Pub) 1, The Joint Staff Officer's Guide 1991, contains line and block charts for all unified and specified commands. The span of control of each CINC ranges from three to seven subordinates plus one for the staff.³⁰ Thus, the span of control problem does not appear to be at the CINC

level, because his organization is essentially fixed. The organizational problems for the operational commander occur between the CINC and the corps commanders. This problem is recognized in FM 100-6.

Whether and when to subdivide a theater of war into more than one theater of operations, and when to recombine separate theaters of operations into a single unified theater, are among the most important decisions facing the commander of a theater of war.³¹

Several Joint publications acknowledge that organization of the theater of war and theater of operations is critical, but do not describe any decision making process to help the commander fulfill his organizational responsibilities.

Some of the comments in the Joint doctrine clearly imply the need for superior organizational skill without providing any specifics. JCS Pub 0-2, Unified Action Armed Forces (UNAAF), states,

Sound command organization should provide for unity of effort, centralized direction, decentralized execution. . . . Decentralized execution is essential because no one commander can control the detailed actions of a large number of units and individuals.³²

Another example of this is found in Joint Chiefs of Staff Publication 3.0 where it states, "The analysis of ends, ways, means and acceptable risk guides CINCs as they organize forces, establish levels of control and allocate resources."³³ A later section entitled "Guidelines for Joint Operations" requires the CINC to "establish a command structure that clearly defines overall command responsibility"³⁴ The requirement to organize forces is also one of the ten fundamentals in designing a campaign plan.³⁵

While it is clear that the operational commander is responsible for organizing his command, the doctrinal literature does not help him

do it. It does not provide any guidance for the staff either in aiding the commander in determining his organization and span of control. AFSC Pub 1, in listing the requirements for the C3 estimate, does not mention span of control or the organization of forces.³⁶

Another source of information on the organization of operational level forces is JCS Pub 5-02.2, Joint Task Force (JTF) Planning Guidance and Procedures. The manual states, "A JTF commander has full authority of organize and reorganize all elements of assigned and attached forces as necessary"³⁷ However, as in all previous cases, there is no direction on how to do this. As a matter of fact, eight factors that determine the organizational structure are listed but none of them consider the span of control of the commander.³⁸ An example of a JTF organization is provided and the number of subordinates to the JTF commander is seven not counting his coordinating and personal staff.³⁹ While the coordinating staff is under control of the chief of staff, the personal staff officers answer directly to the commander. The number of personal staff officers may be as high as five, which would bring the span of control of the commander to thirteen.⁴⁰

Based on the above, operational doctrine on span of control is sorely lacking. At the tactical level, this may not be a problem because the organization (and thus, span of control) is usually specified in the TO&E. At the upper levels of tactical organizations (corps) and at operational levels, there is a tremendous emphasis on the responsibility of the commander to organize his forces. However, none of the doctrinal publications examined included any information concerning span of control. The next section of the monograph will

examine how the civilian world views span of control. The factors that determine and influence span of control will be presented.

SPAN OF CONTROL THEORY - A CIVILIAN PERSPECTIVE

Although the military's treatment of span of control is incomplete, there is no lack of information on span of control in civilian literature. The information available on span of control for civilians is found in management books. There are unique aspects of span of control in the military environment that will be addressed in the next section. However, it is useful to look at the civilian view of span of control because there are many concepts that are transferable to the problems of military span of control. This section will provide a civilian definition of span of control, describe how organizations and span of control relate, and examine those factors that determine the limits of span of control in a civilian organization.

What is span of control? Span of control is a number which measures how many people report directly to a common superior. The maximum number was once believed to be seven.⁴¹ However, this number is far from constant. Other definitions are available and are slightly different. However, they all relate to the number of people that one supervisor can supervise effectively.

The fact that there is a limit on the span of control of an individual is intuitively obvious. People are limited by time, knowledge, skills, interest and motivation in what they can accomplish.⁴² The smaller the span of control, the closer the supervision of the subordinates. This is not necessarily bad, but as the number of managers increases, so does the cost of doing business.

Management books claim that the principle of span of control was first asserted by General Sir Ian Hamilton. He commanded the British forces in the Battle of Gallipoli in World War I. On the subject of span of control, he stated, "The average human brain finds its effective scope in handling three to six other brains."⁴³

The span of control problem is not limited to the number of people one individual supervises. V. A. Graicunas, a French management consultant, published a paper in 1933 that addressed span of control. He identified three types of subordinate-superior relationships: (1) direct single relationships, (2) direct group relationships, and (3) cross-relationships. Graicunas developed a formula to determine the number of all possible types of superior-subordinate relationships requiring managerial attention. With only four subordinates, there are forty-four possible relationships. With five subordinates, the number is one hundred. While this number is not always realized in practice, the complexity of the management problem increases dramatically with the addition of only one subordinate.⁴⁴ The problem of determining span of control is not as simple as it first appears.

In addition to the problems presented by Graicunas, the range of answers on the upper limit of span of control in the literature is quite large. One author states that "Classical theorists agree that span of control should be limited to five or six."⁴⁵ Another author asserts that span of control should be four to eight subordinates at upper levels of management and eight to fifteen at lower levels. However he does add that opinions are divergent on the subject and that a manager may be able to supervise twenty to thirty

subordinates.⁴⁶ One source stated that the span of control of the President of the United States is about one hundred.⁴⁷ Thus, there is no consensus on the limits of span of control.

There is, however, a consensus that while there is a limit on span of control, the exact number is dependent upon several underlying factors and that there are too many variables which impact on the span of control to arbitrarily prescribe a limit.⁴⁸ One author believes that the exact number will vary according to how the underlying factors impact on the time requirements of managing effectively.⁴⁹

In any event, there are some structural factors that affect the span of control. Understanding the different types of organizations and their effect on span of control is essential.

There are two basic types of organizations. They are classified as either flat or tall. The flat structure has very few management layers and is typically associated with a large span of control and decentralization. The tall structure usually has several management layers and is typically associated with a relatively small or narrow span of control and centralization. Both structures have distinct advantages and disadvantages.

The first and most obvious characteristic of the flat structure is that the management costs are smaller because there are fewer management levels. Because of the large span of control in a flat structure, the supervisor is forced to delegate responsibility. This structure also forces the subordinates to exercise initiative and function independently.⁵⁰ In a flat structure, there is a much faster flow of information and less distortion of messages because there are fewer management levels that the information must pass through. In

unstable environments, flat structures can react faster to change because communication from the worker to the supervisor is faster.⁵¹ However, the problems of coordination become more difficult because of the large number of people involved in the coordination effort.⁵² In addition, when a problem solution is sought and there is no clear or objective answer, as in combat, coordination is more difficult in a flat structure.⁵³

The tall structure does have one great advantage over the flat structure. The tall structure is more efficient in problem resolution.⁵⁴ However, tall structures, which are characterized by a narrow span of control, lead to lower morale of the workers. Theoretically, the narrower the span of control, the more closely a supervisor can supervise each subordinate since there are fewer subordinates to supervise.⁵⁵

While the above description seems to argue for the flat structure, studies have shown that there is no significant performance difference between flat and tall structures.⁵⁶ Companies select the type of structure that is best suited for their goals, management styles and personnel. The next section will address those intangibles that affect the span of control.

The factors that influence span of control, and thus, determine the organizational structure, can be divided into two broad categories. They are personality factors and factors external to the manager or organizational factors.⁵⁷ Several sources differ slightly in what these factors are.

The first personality factor is span of attention. This refers to the "number of things a brain can heed at any one time, plus the

length of time it can concentrate on any one thing."⁵⁸ The smaller the span of attention, the smaller the span of control.

The second factor is the knowledge of the supervisor. If the supervisor is well versed in his tasks, then he should be able to supervise more people. In addition, if the subordinates are also knowledgeable in their areas of responsibility, then the supervisor can delegate more authority to them thus widening his span of control.⁵⁹ It must be understood that the span of control is dependent not only on the capabilities of the supervisor, but also of the subordinates.

The final factors are the personality and energy of the supervisor. The personality of the supervisor is difficult to quantify and there are few studies on this aspect of management.⁶⁰ However, characteristics such as commanding respect and loyalty, getting along with people, and comprehending quickly are all part of the manager's personality. The energy in question is both physical and mental. The more energy a supervisor has, the more subordinates he should be able to supervise thus expanding his span of control.

There are several organizational factors that affect span of control. Again, while there is some overlap, there is no total agreement in the literature on what these factors are. Most of these factors come from a study Lockheed did on span of control. They are:

Similarity of functions. The more similar the functions, the larger the span of control.

Geographic contiguity. The closer the subordinates are to the superior, the larger the span of control.

Complexity of functions. The more complex the function, the narrower the span of control.

Direction and control. The closer the supervision, the narrower the span of control.

Coordination. The greater coordination required, the narrower the span of control.

Planning. The more important and complex the planning required, the narrower the span of control.⁶¹

Rate of change of the environment. The faster the external environment changes, the narrower the span of control.⁶²

Number of personal contacts needed. The more personal contacts needed between the superior and subordinate, the narrower the span of control.⁶³

It must also be recognized that span of control is not a static number. There are several reasons why the span of control of a supervisor may change. Once the supervisor has determined what his span of control should be, he must also be sensitive to the following factors that will affect the span of control over time:

- a. Change in structure.
- b. Change in tasks.
- c. Change in technology.
- d. Change in people.⁶⁴

This section has described the factors that determine the span of control of managers. Many of these factors also affect the span of control of military leaders, but some have no impact. The next section will examine what effect these factors have on the military aspects of span of control and investigate the possibility of other

factors that would assist an operational commander in determining the limits of his span of control.

MILITARY LIMITS OF SPAN OF CONTROL

Section II concluded that the military doctrine concerning operational span of control is deficient. In order to determine what affects the limits of operational span of control, it is necessary to borrow concepts from management theory and examine how they fit in a military environment. This section will examine the personality and organizational factors that determine span of control and which variables change over time.

Personality Factors

The first personality factor is the span of attention of the commander. FM 22-103 describes the critical professional skills that a commander must possess. One of these skills is listening.

All too often, senior leaders and commanders through press of time or lack of sensitivity do not listen well or their attention span is distressingly short. . . . This wastes time at best and causes confusion or creates the impression they don't care at worst.⁶⁵

It is clear that the span of attention is an important aspect in determining span of control. A commander cannot make decisions efficiently if they are based on incomplete information. Therefore, a leader who fits the mold of FM 22-103, will have a larger span of control than one who does not listen.

The next factor is the knowledge of the commander. This is clearly an important factor in the span of control equation. The Army's view of this factor is echoed in FM 100-5, Operations, and the Army's leadership manuals. FM 100-5 states, "The most essential element of combat power is competent and confident leadership."⁶⁶ The

senior level leadership manual adds to the above comment. "Possessing appropriate competency skills, therefore is essential." The reason is clear. "The very survival of their (senior leader's) units and soldiers depends on their competency skills."⁶⁷

The Army has not left the competency of operational commanders to chance. There are several programs to ensure that the operational commander is prepared to assume his responsibilities. At the tactical level, the Combat Training Centers ensure that all leaders, in the absence of combat, gain the experience that Clausewitz claims is so important in his book On War. At higher tactical and operational levels, the Battle Command Training Program, General Officer Pre-command Courses, and operational decision exercises are used to improve the competency of the Army's senior leaders. In addition, the Goldwater-Nichols Act requires all officers to spend time on joint staffs in order to be considered for promotion to senior levels. Thus, while knowledge is difficult to measure, the military does have programs to enhance a commander's competence in tactical operational exercises.

The final personality factors are the personality and energy of the commander. These are also difficult to quantify. However, their importance for the military commander are acknowledged. FM 100-5 states, "The skill and personality of a strong commander represent a significant part of his unit's combat power."⁶⁸ The manual also emphasizes that the personal influence of large joint and combined force commanders will have a major bearing on the outcomes of battles and campaigns.⁶⁹ Another aspect of command at all levels and particularly at senior levels is the ability to take risks. An

operational commander cannot wait for certainty in making decisions. He must be able to take risks in order to seize the moment to act.⁷⁰ There are other factors that go into personality. In a discussion of operational command, Michael Barron concluded that control derives from two factors: "properly established command relationships and a commander who is able to convey his intent and infuse his will and determination to those of his command."⁷¹

While the above factors are critical in determining the upper limit of span of control, it is difficult if not impossible to quantify them into a rational decision making process. The operational commander must understand his own strengths and weaknesses to properly organize his forces without exceeding his span of control. The next section will examine the organizational factors that determine span of control. Some of these factors are easier to determine and influence and it is the organizational factors that the remainder of the monograph will focus on.

Organizational Factors

The first organizational factor that influences span of control is the similarity of function of the subordinates. There are three types of organizations that an operational commander can command. The first is a one service force such as a corps, field army or army group. In this case, the functions of the subordinate commanders are essentially the same. This would argue for a large span of control. The second type of force is a joint such as a subunified command or a JTF. In this case, the operational commander would have operational control over other service forces, and the similarity of function would not exist to the same extent as in the above example. This

would limit the commander's span of control. A third type of force is a combined or multi-national force similar to the one in Operation Desert Storm. This type of force would significantly reduce the span of control of an operational commander because of its joint and combined nature and the necessity to direct units with different doctrines, capabilities, cultures, and national interests.

In addition to the subordinate unit commanders, there are other subordinates of a commander who have very dissimilar jobs. The first is the commander's chief of staff. He is responsible for coordinating the efforts of joint and combined staff officers. He has a job like no other subordinate. He "sells" the commander's vision to the staff and is the commander of his staff.⁷² Based on the amount of authority the commander delegates to his chief of staff, the chief may make decisions in the name of the commander, or may just present staff recommendations to the commander for his decisions. In any event, his job is to relieve some of the administrative burdens of command, thus expanding the commander's span of control upper limit. At the same time, his existence adds to the commander's span of control.

The next group of subordinates are the personal staff officers. The personal staff "is directly responsible to the commander. It includes any assistants needed to handle matters requiring close personal control by the commander."⁷³ Examples of the personal staff are the commander's aide, legal adviser, public affairs adviser, inspector general and political affairs adviser. All of the personal staff officers have completely different responsibilities. It could be argued that their role, and the amount of commander's time they

require in combat, may not be great. However, they still require direct access to the commander.

All of the staff and subordinate commanders are organized to assist the commander in executing his responsibilities. While they may improve the decisions of the commander, the time requirements they place on him could degrade the efficiency of command.

The next group of subordinates are known as "directed telescopes." This is a term applied to the various means commanders use in obtaining information from subordinate units.⁷⁴ FM 22-103 outlines the need for a directed telescope. "While indirect observations can and will assist in the making of decisions, they do not provide one essential element: a direct sample of the daily conditions of units and men."⁷⁵ This sample could be through electronic means such as electronic eavesdropping on subordinate unit communications nets, or through the use of a liaison officer who travels to and observes the unit in question. While the use of a staff officer to perform this function will give the commander a different view of the conditions in his subordinate units, it has the disadvantage of increasing the number of subordinates who answer directly to the commander. If directed telescopes are sent to all subordinate units, the commander could easily double his subordinates with a significant decrease in efficiency based only on the necessity to listen to these "directed telescopes."

It appears that regardless of the type of unit, the functions of many subordinates are dissimilar. The subordinate commanders (either U. S. or allied), chief of staff, personal staff and any directed

telescopes all have different functions and areas of expertise while taking up the commanders valuable time and decreasing C2 efficiency.

The next area of concern is the geographic contiguity of subordinates. In the civilian realm, it is possible to collocate subordinates in one building or location for ease of control and coordination. The nature of military operations precludes this arrangement. Dispersion is a fact of life in combat. Although this dispersion decreases the limits on span of control, technology has improved the situation. World War I was dominated by palace generals. Whenever any commander had orders to give to his subordinates, he simply called them back to the headquarters. Colonel-General Helmuth von Moltke, the Chief of the German General Staff in World War I, never visited the front during the war.⁷⁶ The inability to communicate with subordinates forced geographic contiguity at the expense of the subordinate's C2. While the subordinate is at his superior's headquarters receiving orders or providing updates, he is not in control of his forces.

Today's operational commander can communicate with his forces anywhere on the battlefield.⁷⁷ One of the main advantages of the Mobile Subscriber Equipment (MSE) is the ability to interface with communications equipment at echelons above corps. FM 11-37, MSE Primer for Small-Unit Leaders, provides technical specifications for Joint communications equipment to demonstrate this interoperability.⁷⁸

Although geographic dispersion decreases span of control in a civilian environment, it is a fact of life in the military, and cannot be altered. State of the art communications equipment allows the commander to reach all of his subordinates with the same amount of

ease (or difficulty if the campaign or operation is conducted in an active electronic warfare environment). Therefore, it is a minor consideration for a commander in organizing his forces and determining span of control.

The next area is complexity of function. Clausewitz captured the essence of the complexity of warfare. War involves psychological forces and effects, chance and uncertainty and an enemy who reacts to your actions.⁷⁹ The complexity that existed in Clausewitz's day are still present today to a greater extent. Napoleon had eleven functions or agencies to control. During World War II, there were twenty functions or agencies to control. Today on the AirLand Battlefield, there are thirty functions or agencies that the commander must control.⁸⁰ Clearly, the complexity of the commander's job has risen tremendously. However, while the complexity of warfare has increased, it is still essentially a constant for all of the participants at any one time. Thus, while the commander is faced with a monumental task of coordinating all thirty functions or activities, there is very little that he can do to eliminate or reduce this to a more manageable number.

In addition to the number of functions the commander faces, technology has added to the complexity. The C2 systems are capable of overwhelming the commander with information. Some information must be acted on immediately while some may not be critical and can wait. Unless methods are developed to separate the critical information from the routine reports, the efficiency of the headquarters will decrease significantly.⁸¹

Because of the nature of combat, there is little the commander can do to reduce the complexity of commanding operational forces. As a result, while this complexity has an impact on operations, it is not a variable that the commander can alter and should not be a major consideration in determining his span of control.

The direction and control exercised by the commander are the next factors to consider. In a military context, the two alternatives for control are centralized and decentralized control. This is largely determined by how much authority a supervisor or commander delegates to his subordinates. There is a range of how a supervisor can delegate his authority:

1. Look into this problem. Give me all the facts. I will decide what to do.
2. Let me know the alternatives available with the pros and cons of each. I will decide which to select.
3. Recommend a course of action for my approval.
4. Let me know what you intend to do. Delay action until I approve.
5. Let me know what you intend to do. Do it unless I say not to.
6. Take action. Let me know how it turns out.
7. Take action. Communicate with me only if your action is unsuccessful.
8. Take action. No further communication with me is necessary.⁸²

While the range of possibilities is large, the military tends to lean toward three types of supervision. For staff officers, number three is predominant although numbers one through four are used by some commanders. For commanders who give mission type orders, a characteristic of decentralized control, numbers five or six are the preferred alternatives. Other considerations for the type of supervision a commander uses is the amount of time available for the

subordinate commander to back brief his superior and the criticality of the action being taken.

The Army's view on which style is better is clear. FM 100-5 states, "In the chaos of battle, it is essential to decentralize decision authority to the lowest practical level because over centralization slows action and leads to inertia."⁸³ While this makes the Army's position clear on the type of control it expects, it is useful to understand why decentralized control is preferred.

There are several disadvantages to centralized control of operations. Moltke stated the most obvious one.

The advantage which a commander thinks he can attain through continued personal intervention is largely illusory. By engaging in it he assumes a task which really belongs to others, whose effectiveness he destroys. He also multiplies his own tasks to a point where he can no longer fulfill the whole of them.⁸⁴

There are other disadvantages that are not as obvious. Centralized C2 might degrade the quality of command at lower levels.⁸⁵ One reason for this is the requirement for endless reports. Not only is the higher headquarters overwhelmed with reports, but the subordinate unit staffs and commanders must assemble these reports. This can be a time consuming effort while contributing little to the current campaign or operation.

Another weakness of centralized control is the vulnerability to electronic warfare.⁸⁶ Because the technology exists to gather information from anywhere on the battlefield, there is a tendency to use this technology. However, when the communication system becomes the backbone of the C2 system, as it does when centralized control is

exercised, then any disruption in the communication means could be disastrous and all control would be lost.⁸⁷

The doctrinal emphasis on the use of decentralized control is well founded. The rapid tempo of battle will not permit continuous control. Events will overtake and quickly destroy the decision cycle of any commander attempting continuous control according to Michael Barron in his monograph. Barron concludes that decentralized control is not an option but is mandatory on the future battlefield.⁸⁸ However, some control is needed. According to Joseph Drelling in another monograph that describes the operational commander's information needs, "effective control of an organization is impossible without information about what is happening within that organization."⁸⁹ Clearly, decentralized control does not mean no control. How, then, does the commander reach a balance where he can expand his span of control by using a decentralized command style and still have control over his organization?

The way a commander can achieve this balance is through selective use of information. In examining the efficiency of headquarters in World War II, Korea and Viet Nam, Archibald Galloway determined that "It was a major weakness when the (operational) commander crowded his strategic and tactical vision with too many details."⁹⁰ Joseph Drelling reached the same conclusion when he examined operational commander's information requirements. "An operational commander must keep his information needs to a manageable level. He must decide what specific elements of information are important for him to receive personally."⁹¹ Field Circular 101-65, Corps and Division Command and Control, introduces a concept called the CCIR or the Commander's

Critical Information Requirements. These are the items of information that the staff will track in real time and are critical to the decisions that the commander must make.⁹² Although the manual is directed at the tactical level, the same principle has validity at the operational level of war. If a commander has a well-developed set of CCIR, he could significantly expand his span of control. The number of messages directed to the commander would be minimized because his staff and all subordinate commanders know exactly what he wants and needs to make decisions. Therefore, with a decrease in messages, a commander can control more units efficiently.

From the preceding analysis, decentralized command should be the goal of all leaders. This command style allows the commander to expand his span of control and with a well-developed CCIR, he not only can expand his span of control, but reduce the amount of time he and his staff must spend on reading and analyzing messages from subordinates.

The next variable concerns the type of detailed planning required. FM 100-5 provides guidance on planning Joint operations. "In planning and conducting Joint operations, they (operational commanders) will use prescribed Joint operations planning and execution systems."⁹³ This planning system is described in great detail in the Joint Staff Officer's Guide. While the capabilities of the planners will vary from headquarters to headquarters, the planning system operational commanders are expected to use is fixed and has little effect on the commander's span of control.

While the operational commander is provided with a planning system, a methodology for coordination is not well defined.

Coordination between the service components and among the staff officers is part of the planning process. Coordination between the subordinate commanders is less well defined, but no less important. FM 100-5 outlines this importance when it states, "The unit commander cannot depend on constant direction. . . . He must know . . . the responsibilities of the units on his flanks and in support of his operations."⁹⁴ This is absolutely critical - especially when the control is decentralized. Michael Barron concluded that lateral communication is far more important for execution using a concept of decentralized control.⁹⁵ This is reasonable because if not under constant control by a higher commander, it is essential that a commander know the situation of the units on his flanks. Without this knowledge, he could unknowingly expose his flank units to counterattack. If units do not or cannot talk to each other, then the operational commander's span of control should be reduced. The nationality of units fighting side by side is a key consideration in assessing lateral coordination. This lateral coordination not only involves units of the same service, but different services.

Operation Urgent Fury was "plagued by the forces inability to communicate, a problem caused by the services continued practice of buying radios that are not compatible."⁹⁶ In determining a commander's span of control, it is essential that the communications means between the services be considered. The commander must also consider the means of lateral communication at lower levels to ensure that the critical flank and supporting unit coordination can be accomplished. If there is a lack of compatible systems, then

coordination at all levels will suffer and the span of control will be limited to achieve an acceptable level of efficient and continuous C2.

The next variable in the determination of span of control is the rate of change. This refers to how rapidly the external environment changes. If there are rapid changes, a commander would have to have a smaller span of control to maintain control than in a more stable environment. In combat, the rate of change is rapid and operational commanders must be able to keep up with these changes. The reason is obvious. "Only in the rarest circumstances will the enemy's movements conform perfectly to friendly expectations." ⁹⁷ Those commanders who cannot react to change will not be successful. One of the reasons for the Allied defeat in France in 1940 was that the rate of change of the situation exceeded the Supreme Commander of all French Land Forces' (General Gamelin) ability to keep abreast of those changes and make the necessary decisions.⁹⁸ Michael Barron concludes that the tempo of future conflict will be much higher than it has ever been. The impact of technology has created this tempo. It is now possible to acquire real time target intelligence and communicate that intelligence to decision makers who can then launch highly accurate weapons systems to destroy targets at the enemy's operational depth.⁹⁹

Like some of the other factors in this study, considering rate of change in determining the limits of span of control is not very useful. Rapid rate of change is a fact of life in military operations and there is little an operational commander can do to affect this rate. He must, however, recognize that the rapid changes may limit his ability to direct many subordinates. Changes in the operational situation will occur and the commander may have to change missions.

If the time needed to communicate the change of missions exceeds the time the commander has to react to unanticipated situations, then the commander's span of control is too large.

The last factor in determining the limits of span of control is the number of personal contacts needed. John Rogers, in a monograph on the civilian aspects of span of control concluded:

Through better training, clear policy, delegation of responsibility, better planning and control systems and the application of good management practices in general, the number of personal relationships required can be reduced and the span of control expanded.¹⁰⁰

While the reduction of personal relationships may be the goal in the civilian realm, it is not true in the military. FM 100-5 states, "Whenever possible, subordinate leaders should receive their orders face to face from their commanders on the ground chosen for the operation."¹⁰¹ In a monograph that explored the location of the operational commander on the battlefield, Howard Ware studied six operational commanders from World War II. He concluded that commanders should be as far forward as "practical".¹⁰² This feeling is shared by most of the sources examined. The commander must be forward to "hold the pulse of the battle," and be in a position to conduct face to face coordination with his subordinate commanders.¹⁰³ Probably the best example of disastrous consequences when face to face coordination is not accomplished was the Desert One operation. The Holloway Board investigated the operation and concluded that coordination among the various elements of the JTF could have been enhanced by more face to face exchanges.¹⁰⁴

There are, however, several problems with face to face contact at the operational level. Barron believes that commanders can no longer

gain an appreciation for the condition of forces through personal observation because of the size of armies and scope of operations.¹⁰⁵ Although the commander has the ability to provide direction to any subordinate from anywhere on the battlefield, giving face to face instructions to subordinates may not accomplish its intended purpose. No matter where the operational commander issues orders, the size of the units being directed will preclude all but one commander from receiving the mission on the ground where he will have to fight. This movement forward by the commander to give instructions takes valuable time for little gain, and consequently, reduces the commander's span of control.

The second problem concerns the service component commanders. If the operational command is not a joint command, this may pose no problem. If it is a joint command, the operational commander will give orders to an Army commander, a marine commander (or possibly a land component commander) an air force commander, a navy commander, a special operations commander and possibly a JTF commander. Not all of these commanders have a need to see the ground. While it may help the land component commander to receive instructions near the front lines, the navy and air force component commanders may have no need to be well forward. In fact, since most of their assets (air fields and carrier battle groups) will be well away from the front lines, the joint operational commander may create more problems and more disruption of navy and air force C2 by requiring these commanders to move forward for instructions.

While face to face contacts are important, where these contacts occur will have as much or more impact on the commander's span of

control. Technology has increased the number of options a commander has in where he operates, but operating forward has its disadvantages. Rommel, while operating forward, was once out of contact with his main command post for four days.¹⁰⁶ He operated this way because he believed in commanding from the front. However, he could do this without loss of control of his forces because it was predominantly a ground war. Today, the operational commander must direct naval and air forces and to be out of touch with them would be intolerable.

Each of the above variables that determine civilian span of control have been examined in the military context. Some are applicable and must be considered when the commander establishes his organization and method of operation. The span of control can also change over time and these factors must also be considered.

Factors that Change Span of Control

The first factor that can affect span of control over time is a change in structure. Although the guidance in JCS Pub 3.0 requires the operational commander to organize for wartime joint operations in peacetime, situation changes or the addition of forces may require task organization changes. The commander has the option of reorganizing his forces if he determines that his initial span of control was either too small or too large. At the same time, if the organizational structure is such that the command cannot accept additional forces without a major change in the organization of the command, then the operational commander should consider the impact of additional forces on C2 when determining his initial span of control.

An example of a changing span of control with no organizational change is the commitment of an operational reserve. Prior to its

commitment, the operational commander may have little interaction with the reserve commander although technically it is part of his span of control. Upon commitment, the commander will have a significant increase in contact with that reserve commander with no increase in span of control. If the commander's span of control prior to reserve commitment is already at its limit, then he could easily lose control of the situation when he can least afford to.

The next factor is changes in tasks. Like many of the other variables, mission changes are a fact of life in the military. However, at the operational level, there should be fewer mission changes than at the tactical level due to the duration of campaigns and the planning horizons of operational commanders. In any event, the operational commander should consider how his organization can accommodate branches and sequels in the campaign plan. If the force is to be agile, then so must the command structure.

The third factor is the change in technology. The next war will be a come as you are war. If it is a short war such as Desert Storm, the industrial base will not be able to develop, manufacture and field new technology during the war. In this technological age, just changing from the M60A3 to the M1A1 tank requires sixty days of new equipment training (NET) for active duty tank crewmen. When exotic technology is added, it is not enough to train a soldier on how to operate it. The soldier must also be trained on the tactics of employment. This is something that takes time. New technology in the hands of an untrained soldier is dangerous. Thus, changing technology will have a minor impact, if any, when the operational commander determines his organization and span of control.

The final factor is change in people. As previously mentioned, changes in personnel due to normal rotations, promotions and casualties are another fact of military life. While the operational commander will establish his organization with the personalities of his staff and subordinate commanders in mind, he must organize his forces so that his organization will be able to continue if key personnel are replaced. Thus, to push the limits of span of control because of one or several exceptional subordinates would not be prudent because of the effect on the organization when they are replaced.

Summary

This section has taken the factors that determine the span of control in management and examined their affect in a military environment. Some of the factors have little bearing on the military span of control. There are a few that the operational commander must understand if he is to organize his forces so that he can control them.

The commander must first know himself. Personality has a tremendous impact on the span of control equation and while most senior officers have essentially the same background, experience and training, the personality factor cannot be overlooked.

From the organizational perspective, the variables that appear to influence span of control are similarity of function, the style of control the commander exercises over the force, the coordination required between the various subordinates/services and the number of personal contacts that the commander uses in his command style.

Changes in span of control can occur due to four variables, but the operational commander should concern himself with potential changes in structure (task organization), changes in tasks (missions) and changes in people (staff and commanders) when he develops his organization.

CONCLUSION

This study has examined the factors that influence the span of control for an operational commander. Determining the optimum span of control is a very complex task. If the span of control of a commander is too large, then the commander cannot efficiently or continuously control his forces. The span of control issue is unique to the operational level commander. He is required by Joint and Army doctrine to organize his forces. In order to do this, he must understand the limits of his span of control when making organizational decisions. Unfortunately, understanding the factors that influence span of control will not help a commander establish his initial span of control. They will only help him adjust it given a number of subordinates and a situation. Based on the information from the brigade, division, corps and large unit field manuals, two to five subordinate units appear to be a reasonable starting place when the commander organizes his forces. Then, based on the factors presented above, the commander can adjust his span of control.

The study started with a look at the theoretical and doctrinal basis for understanding span of control. Clausewitz did not explicitly use the term "span of control" but referred to it when he described the number of elements that should be in an army. He made a distinction between the tactical and operational level span of

control, but only considered a number as the upper limit of span of control without examining the factors that determined that number.

Although the phrase "span of control" is used in military publications, it is not defined in either Army or Joint manuals. Tactical commanders normally do not need to understand the factors that influence span of control because their span of control is determined by the Tables of Organization and Equipment (TO&E).

At the operational level, understanding what factors affect span of control is essential. The unified commander's organization is outlined in the Joint Staff Officer's Guide, but for subunified commands, Joint task force organizations, field armies or army groups, the operational commander must establish his own organization. However, doctrine does not provide a methodology for doing this.

Although the military does not define or describe span of control, there is a wealth of information on it in management books. The variables that affect span of control are either personal or organizational and the optimum span of control is not a fixed number but can change over time. The organizational factors that appear to have the most influence on the commander's span of control are the similarity of function of the subordinates, the style of control the commander exercises over the force, the type of coordination between the commander and his subordinates and staff, and the number of personal contacts that the commander uses in his command style. Changes in the structure (task organization), tasks (missions) and personnel changes will also affect the limits of span of control over time.

There are three major doctrinal implications in this study. It is clear that span of control is critical at the operational level. Since the commander organizes his forces, he must understand the affect of variables on span of control if he is to develop an organization that will facilitate continuous and efficient command and control. Army and Joint doctrine is deficient in guiding the commander in organizing his forces. This doctrinal void must be filled in future Joint publications.

The second doctrinal implication is the criticality of reducing the amount of information the commander is presented during battle. Technology has provided the commander with the means to get information from all over the battlefield at any time. Too much information can cause command paralysis. The commander must establish a list of critical items of information that he needs to make decisions. The Commander's Critical Information Requirements (CCIR) should be added to all campaign plans similar to the priority intelligence requirements (PIR). This would ensure that all subordinate elements focus on that information that the commander needs to make his decisions. This would go a long way to expanding the commander's span of control.

Finally, the command selection process is critical. Three factors in the span of control equation are personality based. The military education system must inculcate in officers, starting at the basic course, the philosophy and traits that foster decentralized control. This is the primary factor that will enable a commander to expand his span of control.

ENDNOTES

- 1 Leonard P. Wishart, "Leader Development and Command and Control," Military Review, July 1990, p. 12.
- 2 United States Department of Defense, Joint Publication 1-02, Department of Defense Dictionary of Military and Associated Terms, Washington, D. C., 1 December 1989, p. 77.
- 3 United States Army, FM 100-5, Operations, Washington, D.C., 5 May 1986, p. 21.
- 4 United States Army Regulation, 310-25, Dictionary of Military Terms, Washington, D. C., 15 October 1983, and United States Army, FM 101-5-1, Operational Terms and Symbols, Ft. Leavenworth, Ks., 21 October 1985.
- 5 JCS Pub 1-02, Department of Defense Dictionary of Military and Associated Terms.
- 6 Carl von Clausewitz, On War, edited and translated by Michael Howard and Peter Paret (Princeton, N.J.: Princeton University Press, 1984) p. 292)
- 7 Ibid., p. 293.
- 8 Ibid., p. 294.
- 9 Ibid.
- 10 Ibid., p. 295.
- 11 Martin Van Creveld, Command in War (Cambridge, Mass.: Harvard University Press, 1985), p. 98.
- 12 Clausewitz, On War, p. 294.
- 13 Ibid., p. 295.
- 14 United States Army, FM 71-3, Armored and Mechanized Infantry Brigade, Ft. Knox, Ky., 11 May 1988, p. 1-5.
- 15 United States Army, FM 71-100, Division Operations, Ft. Leavenworth, Ks., 16 June 1990, p. 2-1.
- 16 United States Army, FM 100-15, Corps Operations, Washington, D.C., 13 September 1989, p. 2-1.
- 17 Ibid., p. 2-3.
- 18 Ibid.

19 Andrew S. Sandoy, "Span of Control and Initiative: Is More, Less?" SAMS Monograph, Fort Leavenworth, Kansas: U. S. Army Command and General Staff College, January 1991, p. 40.

20 United States Army, FM 22-103, Leadership and Command at Senior Levels, Washington, D. C., 21 June 1987, p. 3.

21 United States Army, FM 22-100, Military Leadership, Washington, D. C., 31 July 1990, p. viii.

22 United States Army, FM 100-6, Large Unit Operations (Coordinating Draft), Ft. Leavenworth, Ks., September 1987, p. 3-23.

23 Ibid.

24 FM 22-103, pp. 51-54.

25 Ibid., p. 49.

26 FM 100-6, p. 5-1.

27 Ibid., p. 4-10.

28 Ibid., p. 5-3.

29 United States Joint Chiefs of Staff, Publication 3.0, Doctrine for Unified and Joint Operations, Washington, D. C., January 1990, p. III-1.

30 Armed Forces Staff College, Publication 1, The Joint Staff Officer's Guide 1991, Norfolk, Virginia: Joint and Combined Staff Officer School, 1991, pp 2-27 to 2-36.

31 FM 100-6, p. 2-3.

32 United States Joint Chiefs of Staff, Publication 0-2, Unified Action Armed Forces (UNAAF), Washington, D. C., 1 December 1986, p. 3-2.

33 JCS Pub 3.0, p. III-6.

34 Ibid., p. III-11.

35 Ibid., p. III-8.

36 AFSC Pub 1, p. E-1.

37 United States Joint Chiefs of Staff, Publication 5-00.2, Joint Task Force (JTF) Planning Guidance and Procedures, Washington, D. C., 15 June 1988, p. II-11.

38 Ibid., p. II-14.

- 39 Ibid., p. 11-19.
- 40 AFSC Pub 1, pp. 2-38 to 2-39.
- 41 Ross A. Webber, Management: Basic Elements of Managing Organizations (Homewood, Illinois: Richard D. Irwin, Inc., 1979), p. 356.
- 42 Max D. Richards and Paul S. Greenlaw, Management Decisions and Behavior (Homewood, Illinois: Richard D. Irwin, Inc., 1972), p. 252.
- 43 Ernest Dale, Management: Theory and Practice (New York, New York: McGraw-Hill Book Company, 1978), p. 112.
- 44 Harold Koontz, Cyril O'Donnell, and Heinz Weihrich, Management (New York, New York: McGraw-Hill Book Company, 1980), pp. 341-343.
- 45 John E. Rogers, "Span of Control: An Analysis of Influencing Factors." Monograph, Carlisle Barracks, Pa.: U. S. Army War College, March 1972, p. 4.
- 46 Koontz, Management, p. 338.
- 47 Webber, Management: Basic Elements of Managing Organizations, pp. 356-357.
- 48 Koontz, Management, p. 340, and Rogers, "Span of Control: An Analysis of Influencing Factors," p. 5.
- 49 Ibid., p. 354.
- 50 Rogers, "Span of Control: An Analysis of Influencing Factors," p. 5.
- 51 David M. Hunter, Supervisory Management: A Skill-Building Approach (Reston, Virginia: Reston Publishing Company, Inc., 1981), p. 132.
- 52 Koontz, Management, p. 349.
- 53 Ibid.
- 54 Ibid., p. 348.
- 55 Gary Dessler, Organization and Management (Reston, Virginia: Reston Publishing Company, Inc., 1982), p. 78.
- 56 Koontz, Management, p. 348.
- 57 Rogers, "Span of Control: An Analysis of Influencing Factors," p. 9.

- 58 Ibid.
- 59 Ibid., p. 10.
- 60 William G. Glueck, Management (Hinsdale, Illinois: The Dryden Press, 1980), p. 379.
- 61 Koontz, Management, pp. 350-351.
- 62 Hunter, Supervisory Management: A Skill-Building Approach, pp. 132-133.
- 63 Rogers, "Span of Control: An Analysis of Influencing Factors," pp. 12-16.
- 64 Dessler, Organization and Management, pp 641-643.
- 65 FM 22-103, pp. 35-36.
- 66 FM 100-5, p. 13.
- 67 FM 22-103, p. 31.
- 68 FM 100-5, p. 14.
- 69 Ibid.
- 70 Paul D. Hughes, "Mercury's Dilemma: C3I and the Operational Level of War." SAMS Monograph, Fort Leavenworth, Kansas: U. S. Army Command and General Staff College, May 1988, p. 35.
- 71 Michael J. Barron, "Operational Level Command -- Who is in Charge?" SAMS Monograph, Fort Leavenworth, Kansas: U. S. Army Command and General Staff College, May 1988, p. 3.
- 72 Richard F. Vaughn, "Staff Control and the Chief of Staff's Challenge in an Operational Level Headquarters." SAMS Monograph, Fort Leavenworth, Kansas: U. S. Army Command and General Staff College, May 1988, p. 37.
- 73 AFSC Pub 1, p. 2-38.
- 74 G. B. Griffin, The Directed Telescope: A Traditional Element of Effective Command (Ft. Leavenworth, KS.: Combat Studies Institute, 1985), p. 29.
- 75 FM 22-103, p. 13.
- 76 Howard L. Ware, "Command Presence: Where Should the Operational Commander be Located on the Modern Battlefield?" SAMS Monograph, Fort Leavenworth, Kansas: U. S. Army Command and General Staff College, May 1989, p. 6.

77 Joseph S. Drelling, "Airland Battle and the Operational Commander's Information Requirements." SAMS Monograph, Fort Leavenworth, Kansas: U. S. Army Command and General Staff College, May 1989, p. 1.

78 United States Army, FM 11-37, MSE Primer for Small-Unit Leaders, Washington, D. C., 14 November 1990, pp. A-1 to A-13.

79 Clausewitz, On War, pp. 136-140.

80 William E. DePuy, "Concepts of Operation: Heart of Command, Tool of Doctrine." Army. Volume 38, Number 8, August 1983, p. 29. The following demonstrates the growth of complexity in warfare over the ages.

NAPOLÉONIC WARS

MANEUVER

- Infantry
- Cavalry

INTELLIGENCE

- Human Intelligence
- Reconnaissance

FIRE SUPPORT

- Tube Artillery
- Congreve-type
Rockets

LOGISTICS

- Supply
- Transportation
- Medical
- Administration

ENGINEER

WORLD WAR II

MANEUVER

- Infantry
- Cavalry
- Armor

INTELLIGENCE

- Human Intelligence
- Reconnaissance
- Signal Intelligence

FIRE SUPPORT

- Tube Artillery
- Rockets

LOGISTICS

- Supply
- Transportation
- Medical
- Administration
- Maintenance

AIR DEFENSE

- Automatic Weapons
- Guns

ENGINEER

TACTICAL AIR SUPPORT

- Air Defense
- Armed Reconnaissance
- Airlift
- Interdiction

TODAY

MANEUVER

- Infantry
- Cavalry
- Armor
- Attack Helicopters

INTELLIGENCE

- Human Intelligence
- Commo Intell
- Electronic Intell
- Reconnaissance, Surveillance and Target Acquisition

FIRE SUPPORT

- Tube Artillery
- Rockets
- Missiles

LOGISTICS

- Supply
- Transportation
- Medical
- Maintenance
- Administration

AIR DEFENSE

- Automatic Weapons
- Guns
- Missiles

TACTICAL AIR SUPPORT

- BAI
- Close Air Support
- Air Defense
- Reconnaissance
- Airlift
- Interdiction
- Surveillance
- Target Acquisition

ENGINEER

81 Hughes, "Mercury's Dilemma: C3I and the Operational Level of War," p. 17.

82 Webber, Management: Basic Elements of Managing Organizations, p. 358.

83 FM 100-5, p. 15.

84 Walter Goerlitz, History of the German General Staff, 1647-1945. Translated by Brian Battershaw, New York: Praeger, 1953, p. 76.

85 Hughes, "Mercury's Dilemma: C3I and the Operational Level of War," p. 16.

86 Ibid., p. 29.

87 FM 100-5, p. 4 and Barron, "Operational Level Command -- Who is in Charge?" p. 32.

88 Michael J. Barron, "C3 on the AirLand Battlefield: Striking a Balance between Communications Means and Information Needs." SAMS Monograph, Fort Leavenworth, Kansas: U. S. Army Command and General Staff College, January 1988, p. 30.

89 Drelling, "Airland Battle and the Operational Commander's Information Requirements." p. 8.

90 Archibald Galloway, "Operational Functions of U.S. Army Contingency Headquarters--Do They Meet the Requirements for the Operational Level of War?" SAMS Monograph, Fort Leavenworth, Kansas: U. S. Army Command and General Staff College, April 1986, p. 23.

91 Drelling, "Airland Battle and the Operational Commander's Information Requirements." p. 37.

92 United States Army, FC 101-55, Corps and Division Command and Control, Ft Leavenworth, Ks., February 1985, p. G-1.

93 FM 100-5, p. 28.

94 Ibid., p. 22.

95 Barron, "C3 on the AirLand Battlefield: Striking a Balance between Communications Means and Information Needs." p. 38.

96 S. Nunn, "Defense Organization: The Need for Change." Armed Forces International, 123. Volume 4, pp. 13-15.

97 FM 100-6, p. 3-40.

98 Barron, "Operational Level Command -- Who is in Charge?" p. 30.

99 Ibid., p. 28.

100 Rogers, "Span of Control: An Analysis of Influencing Factors," p. 16.

101 FM 100-5, p. 21.

102 Ware, "Command Presence: Where Should the Operational Commander be Located on the Modern Battlefield?" p. 38.

103 Chris Bellamy, The Future of Land Warfare (New York: St. Martin's Press, 1987), p. 268 and Hughes, "Mercury's Dilemma: C3I and the Operational Level of War," p. 29.

104 United States Department of Defense. Holloway Board: Rescue Mission Report. Washington, D. C.: Special Operations Review Group chaired by ADM (Ret) James L. Holloway, III, August 1980, pp. 25-26.

105 Barron, "Operational Level Command -- Who is in Charge?" p. 11.

106 Ware, "Command Presence: Where Should the Operational Commander be Located on the Modern Battlefield?" p. 22.

BIBLIOGRAPHY

BOOKS

- Bellamy, Chris. The Future of Land Warfare. New York: St. Martin's Press, 1987.
- Blau, Peter M. and Schoenherr, Richard A. The Structure of Organizations. New York, New York: Basic Books, Inc., 1971.
- Clausewitz, Carl von. On War. Edited and translated by Michael Howard and Peter Paret. Princeton: Princeton University Press, 1984.
- Dale, Ernest. Management: Theory and Practice. New York, New York: McGraw-Hill Book Company, 1978.
- Deesler, Gary. Organization and Management. Reston, Virginia: Reston Publishing Company, Inc., 1982.
- Goerlitz, Walter. History of the German General Staff, 1647-1945. Translated by Brian Battershaw, New York: Praeger, 1953.
- Glueck, William F. Management. Hinsdale, Illinois: The Dryden Press, 1980.
- Hunter, David M. Supervisory Management: A Skill-Building Approach. Reston, Virginia: Reston Publishing Company, Inc., 1981.
- Jomini, Baron de. The Art of War. In Roots of Strategy. Edited by BG J. D. Hittle. Book 2. Harrisburg, Pa.: Stackpole Books, 1987.
- Kellett, Anthony. Combat Motivation. Hingham, Mass.: Kluwer Boston, Inc., 1982.
- Koontz, Harold; O'Donnell, Cyril; and Weihrich, Heinz. Management. New York, New York: McGraw-Hill Book Company, 1980.
- Marshall, S. L. A. Men Against Fire. Gloucester, Mass.: Peter Smith, 1978.
- McManmon, George M. ed. Military Management. Troy, Alabama: Troy State University, 1975.
- Reznichenko, Vasilii, G., Vorobyev, Ivan N. and Miroshnichenko, Nikolay, F. Taktika. Translated by the Foreign Broadcast Information Service, United States Government, 29 June 1988.

Richards, Max D. and Greenlaw, Paul S. Management Decisions and Behavior. Homewood, Illinois: Richard D. Irwin, Inc., 1972.

Van Creveld, Martin. Command in War. Cambridge, Mass.: Harvard University Press, 1985.

Webber, Ross A. Management: Basic Elements of Managing Organizations. Homewood, Illinois: Richard D. Irwin, Inc., 1979.

ARTICLES

DePuy, William E. "Concepts of Operation: Heart of Command, Tool of Doctrine." Army. Volume 38, Number 8, August 1988, p. 29.

Nunn, S., "Defense Organization: The Need for Change." Armed Forces International, 123. Volume 4, pp. 13-15.

Wishart, Leonard P. "Leader Development and Command and Control," Military Review, July 1990, pp. 11-17.

THESES

Barron, Michael J. "C3 on the AirLand Battlefield: Striking a Balance between Communications Means and Information Needs." SAMS Monograph, Fort Leavenworth, Kansas: U. S. Army Command and General Staff College, January 1988.

Barron, Michael J. "Operational Level Command -- Who is in Charge?" SAMS Monograph, Fort Leavenworth, Kansas: U. S. Army Command and General Staff College, May 1988.

Burton, Michael A. "Command and Control: Is the U.S. Army's Current Problem With Decentralized Command and Control a Function of Doctrine or Training?" SAMS Monograph, Fort Leavenworth, Kansas: U. S. Army Command and General Staff College, December 1986.

Crenshaw, Charles T. III. "Distinctions Between Tactical and Operational Levels of War -- Are Some More Important Than Others?" SAMS Monograph, Fort Leavenworth, Kansas: U. S. Army Command and General Staff College, May 1986.

Drelling, Joseph S. "Airland Battle and the Operational Commander's Information Requirements." SAMS Monograph, Fort Leavenworth, Kansas: U. S. Army Command and General Staff College, May 1989.

Drummond, Raymond R. "The Unified Command System and Unity of Command." SAMS Monograph, Fort Leavenworth, Kansas: U. S. Army Command and General Staff College, May 1986.

- Galloway, Archibald. "Operational Functions of U.S. Army Contingency Headquarters--Do They Meet the Requirements for the Operational Level of War?" SAMS Monograph, Fort Leavenworth, Kansas: U. S. Army Command and General Staff College, April 1986.
- Gardner, Gregor C. "Generalship in War: The Principles of Operational Command." SAMS Monograph, Fort Leavenworth, Kansas: U. S. Army Command and General Staff College, May 1987.
- Gilbert, Daniel J. "Joint Task Force Command, Control, and Communications: Have We Improved?" SAMS Monograph, Fort Leavenworth, Kansas: U. S. Army Command and General Staff College, May 1989.
- Hughes, Paul D. "Mercury's Dilemma: CSI and the Operational Level of War." SAMS Monograph, Fort Leavenworth, Kansas: U. S. Army Command and General Staff College, May 1988.
- MacLean, French L. "The Chief of Staff at the Operational Level--Tailored for Excellence or Bought Off the Rack?" SAMS Monograph, Fort Leavenworth, Kansas: U. S. Army Command and General Staff College, May 1989.
- Noble, Joseph E. "Conflicting Concepts - Command and Control." SAMS Monograph, Fort Leavenworth, Kansas: U. S. Army Command and General Staff College, December 1988.
- Rogers, John E. "Span of Control: An Analysis of Influencing Factors." Monograph, Carlisle Barracks, Pa.: U. S. Army War College, March 1972.
- Runals, Stephen E. "Command and Control: Does Current U. S. Army Tactical Command and Control Doctrine Meet the Requirement for Today's High Intensity Battlefield?" SAMS Monograph, Fort Leavenworth, Kansas: U. S. Army Command and General Staff College, December 1985.
- Sandoy, Andrew S. "Span of Control and Initiative: Is More, Less?" SAMS Monograph, Fort Leavenworth, Kansas: U. S. Army Command and General Staff College, January 1991.
- Schmader, John R. "Command Information Requirements on the AirLand." MMAS Thesis, Fort Leavenworth, Kansas: U. S. Army Command and General Staff College, June 1985.
- Vaughn, Richard F. "Staff Control and the Chief of Staff's Challenge in an Operational Level Headquarters." SAMS Monograph, Fort Leavenworth, Kansas: U. S. Army Command and General Staff College, May 1988.

Ware, Howard L. III. "Command Presence: Where Should the Operational Commander be Located on the Modern Battlefield?" SAMS Monograph, Fort Leavenworth, Kansas: U. S. Army Command and General Staff College, May 1989.

Wolf, James F. "Beyond Ten in Ten: Command and Control of Follow-On U. S. Divisions to AFCENT." SAMS Monograph, Fort Leavenworth, Kansas: U. S. Army Command and General Staff College, May 1989.

MANUALS AND OTHER MILITARY PUBLICATIONS

Armed Forces Staff College, Publication 1, The Joint Staff Officer's Guide 1991, Norfolk, Virginia: Joint and Combined Staff Officer School, 1991.

Center For Army Lessons Learned. Command and Control. Combined Arms Training Activity, Ft. Leavenworth, Ks., February 1987.

Center For Army Lessons Learned. Commander's Survivability. Combined Arms Training Activity, Ft. Leavenworth, Ks., January 1988.

Center For Army Lessons Learned. Corps/Division Lessons Learned. Combined Arms Training Activity, Ft. Leavenworth, Ks., November 1989.

United States Army, FC 101-55, Corps and Division Command and Control. Ft Leavenworth, Ks., February 1985.

United States Army, FM 11-37, MSE Primer for Small-Unit Leaders. Washington, D. C., 14 November 1990.

United States Army, FM 22-100, Military Leadership. Washington, D. C., 31 July 1990.

United States Army, FM 22-103, Leadership and Command at Senior Levels. Washington, D. C., 21 June 1987.

United States Army, FC 71-6, Battalion and Brigade Command and Control. Ft. Knox, Ky. and Ft. Benning, Ga., 1 March 1985.

United States Army, FM 71-3, Armored and Mechanized Infantry Brigade. Ft. Knox, Ky., 11 May 1988.

United States Army, FM 71-100, Division Operations. Ft. Leavenworth, Ks., 16 June 1990.

United States Army, FM 100-5, Operations. Washington, D.C., 5 May 1986.

United States Army, FM 100-6, Large Unit Operations (Coordinating Draft). Ft. Leavenworth, Ks., September 1987.

United States Army, FM 100-15, Corps Operations. Washington, D.C., 13 September 1989.

United States Army, FM 101-5, Staff Organization and Operations. Ft. Leavenworth, Ks., 25 May 1985.

United States Army, FM 101-5, Command and Control for Commanders and Staff (Draft). Ft. Leavenworth, Ks., March 1990.

United States Army, FM 101-5-1, Operational Terms and Symbols. Ft. Leavenworth, Ks., 21 October 1985.

United States Army, ST 100-9, The Command Estimate. Fort Leavenworth, Ks., 1 July 1989.

United States Army Regulation, 310-25, Dictionary of Military Terms, Washington, D. C., 15 October 1983.

United States Joint Chiefs of Staff, Publication 0-2, Unified Action Armed Forces (UNAAF), Washington, D. C., 1 December 1986.

United States Joint Chiefs of Staff, Publication 1-02, Department of Defense Dictionary of Military and Associated Terms, Washington, D. C., 1 December 1989.

United States Joint Chiefs of Staff, Publication 3.0, Doctrine for Unified and Joint Operations, Washington, D. C., January 1990.

United States Joint Chiefs of Staff, Publication 5-00.2, Joint Task Force (JTF) Planning Guidance and Procedures, Washington, D. C., 15 June 1988.

OTHER SOURCES

Griffin, G. B. The Directed Telescope: A Traditional Element of Effective Command. Ft. Leavenworth, KS.: Combat Studies Institute, 1985.

United States Army. Corps and Division Commanders' MSE Handbook. Combined Arms Combat Developments Activity, Ft Leavenworth, Ks., undated.

United States Department of Defense. Holloway Board: Rescue Mission Report. Washington, D. C.: Special Operations Review Group chaired by ADM (Ret) James L. Holloway, III, August 1980.